

O P E R A T I N G   A N D   S E R V I C E   M A N U A L

**LOGIC CLIP**

**10528A**

HEWLETT  PACKARD

### CERTIFICATION

*The Hewlett-Packard Company certifies that this instrument was thoroughly tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facility.*

### WARRANTY AND ASSISTANCE

This Hewlett-Packard product is warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery, or, in the case of certain major components listed in the manual, for the specified period. We will repair or replace products which prove to be defective during the warranty period provided they are returned to Hewlett-Packard. No other warranty is expressed or implied. We are not liable for consequential damages.

Service contracts or customer assistance agreements are available for Hewlett-Packard products that require maintenance and repair on-site.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office.

# LOGIC CLIP

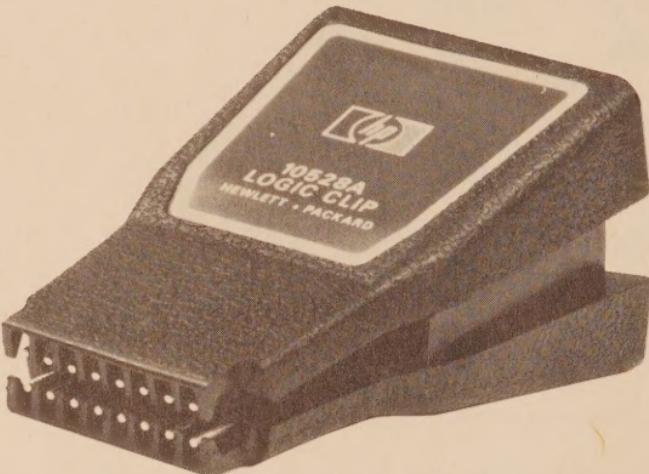
## 10528A

Copyright      HEWLETT-PACKARD COMPANY      1970  
5301 STEVENS CREEK BLVD., SANTA CLARA, CALIF. 95050

Printed: JUL 1972

HEWLETT  PACKARD

Figure 1. 10528A Logic Clip



## 1. APPLICATION

The 10528A Logic Clip is designed for logic level determination on integrated circuits using transistor-transistor-logic (TTL) and diode-transistor-logic (DTL) but not ECL. The clip can test flip flops, gates, counters, buffers, adders, and shift registers, etc. It will not test IC's with non-standard input levels or expandable gates. It will instantly and continuously show the logic levels at all pins of a dual in-line IC. All 16 input pins are electrically buffered to minimize loading on any circuit being tested. Sixteen light emitting diodes (LED) and the "high" and "low" logic level indicators. No power supply connections need to be made; the Logic Clip powers itself from the circuit under test by automatically locating the Vcc and ground pins of the IC.

## 2. SPECIFICATIONS

### Power Requirements:

5 volts  $\pm 10\%$  across any two pins at 140 milliamperes maximum current.

**Input Threshold:**

LED will indicate "high" (glow) if IC pin is above +2.0 volts, and LED will indicate "low" if pin is below +0.8 volts. (If IC pin is open, LED will show high.)

**Input Impedance:**

One TTL load (-1.2 milliamperes typical per input pin).

**Input Limits:**

Voltages < -1 or >7 must be current limited to 10 milliamperes or less.

**Compatibility:**

TTL or DTL (up to 16-pin, dual in-line packages).

**Temperature:**

0°C to 55°C.

**3. INSTALLATION-OPERATION****CAUTION**

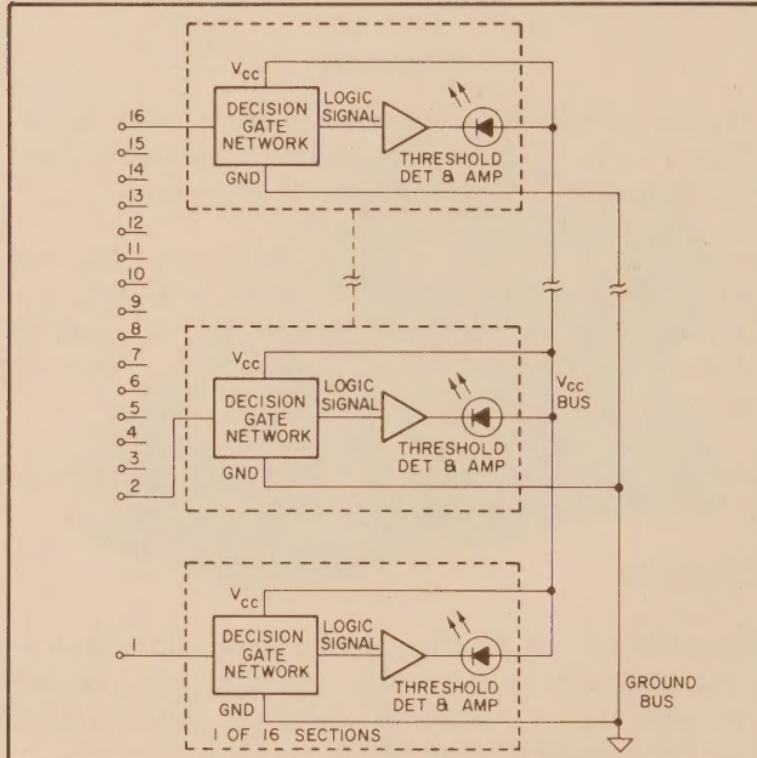
Do not connect the Logic Clip to an IC with more than 7 volts DC between any two pins unless current is limited to less than 10 milliamperes.

Squeeze the thick end of the clip to spread the contacts, and place the clip on the IC to be tested. See Figure 1. The LED's on top of the clip will indicate the logic levels at each connected IC pin. (The clip may be turned in either direction.)

There are no operating controls or service adjustments on the logic clip.

**4. THEORY**

Figure 2 is a block diagram for the logic clip. Each pin of the logic clip is internally connected to a decision gate network, a threshold detector, and a driver amplifier connected to an LED.

**Figure 2. Logic Clip Block Diagram**

## 5. DECISION GATE NETWORK

The decision gate networks do the following:

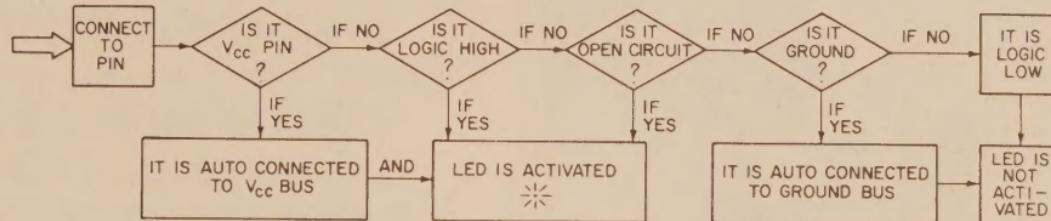
- Find IC Vcc pin (power voltage) and connect it to the clip power voltage bus. (This also activates an LED.)
- Find all logic high pins, and activate corresponding LED's.
- Find all open circuits and activate corresponding LED's.
- Find the IC ground pin, connect it to the clip ground bus, and blank the corresponding LED.

Figure 3 shows the decision gate network flow diagram.

## 6. THRESHOLD DETECTOR-AMPLIFIER

The threshold detector measures the input voltage. If the voltage is over the threshold voltage, the LED is activated. If the voltage is less than the threshold voltage, the LED is not activated. An amplifier at the output of the threshold detector drives the LED.

Figure 3. Decision Gate Network Flow Diagram



## 7. TESTING THE LOGIC CLIP

If the operation of the logic clip is suspected to be wrong, the operation of each pin network should be tested with relation to the others.

### NOTE

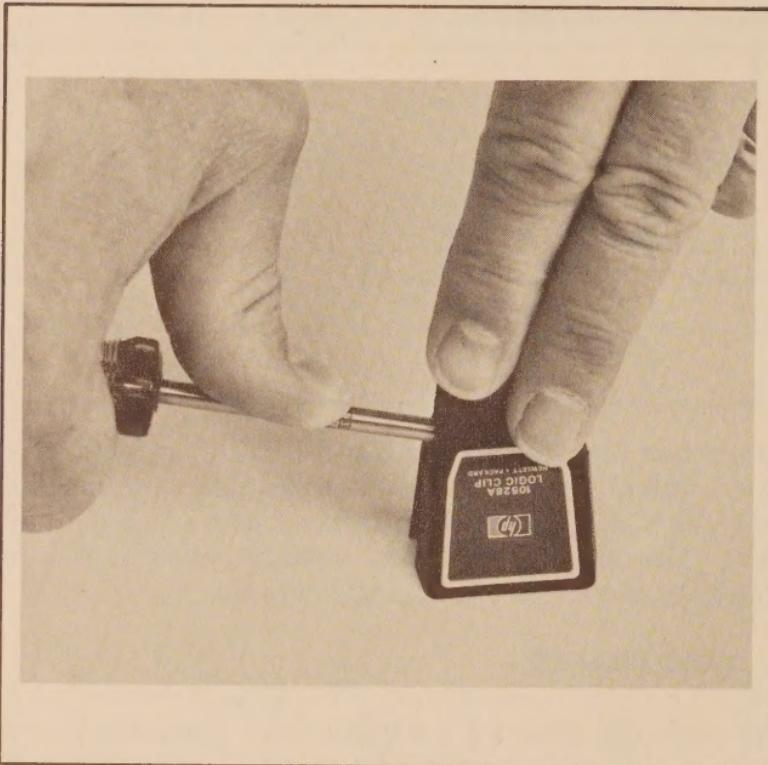
For correct operation the Logic Clip must have at least 1 Vcc pin and ground pin. Logic clip pins not connected to any circuit will indicate a high.

A five-volt battery can be used to check each logic clip pin network for correct operation. Connect five volts

across two pins, the remaining 14 LED's (and the +Vcc LED) should glow. Ground each pin one at a time except +Vcc, and each LED that has a ground should not glow. Use an adjustable low voltage power supply to check the threshold of each logic clip pin.

## 8. MAINTENANCE

The logic clip internal electronic logic assembly is one molded part, and it cannot be repaired except for contact pin replacement. The case halves, springs, and labels are replaceable (see: 9. Parts Replacement).

**Figure 4. Logic Clip Disassembly Procedure**

## 9. PARTS REPLACEMENT

Although disassembly is NOT recommended, the internal logic assembly can be removed as follows:

- a. Hold indicating LED's down flat on work surface.
- b. Squeeze pins at end of clip together.
- c. Insert flat side of small screwdriver (Figure 4) in at side opening, or use the tool as shown in Figure 5.
- d. Press down gently and firmly until red LED assembly snaps out.
- e. To assembly place the inside of the cover halves facing each other with the pin on one side opposite the hole on the other.
- f. Place the cover teeth end down on a table.
- g. Push gently as if to slide one half past the other until the sides snap together.
- h. Squeeze the spring tips and insert it as shown in Figure 6. Install one spring on each side.

- i. Rotate the coil part of the spring down into the cover assembly.
- j. Position the spring coil part against the flat side of the cover and with the ends in the grooves.
- k. Remove the protective paper from the foil labels and place the adhesive side on the cover face.

**NOTE**

A rubber pad  $3/16'' \times 3/4'' \times 1/1''$  will be required. This can be cut from a regular pencil eraser or plastic eraser.

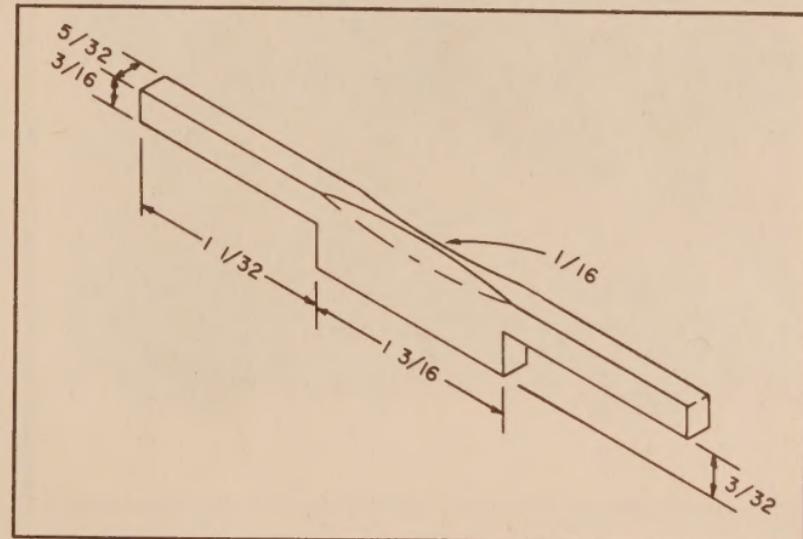
- l. Insert the rubber pad between the covers just behind the pin guides as shown in Figure 7.
- m. Place the cover teeth end down as shown in Figure 8.
- n. Insert the pins into the covers guiding them into their respective grooves.
- o. Squeeze the teeth end of the cover.
- p. Push the body (rock gently from side to side) until the pins are seated in the cover guides.

- q. Remove the rubber pad.

- r. While holding pin end of covers tightly closed, push down with your thumbs until the body snaps into the cover.

- s. Test the clip for proper operation.

**Figure 5. Extractor Tool**



**Figure 6. Spring Insertion**



**Figure 7. Spacer Pad Insertion**

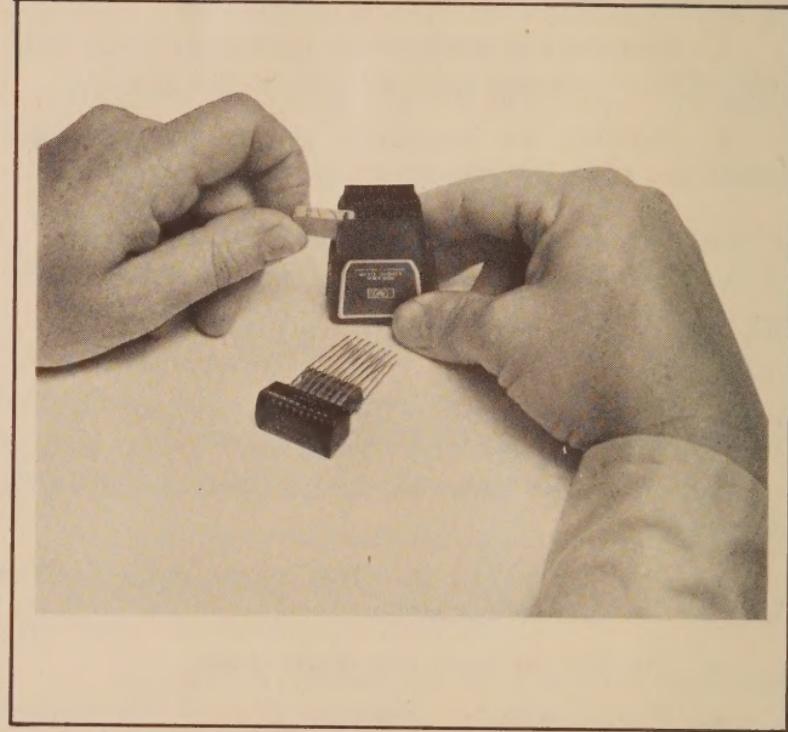
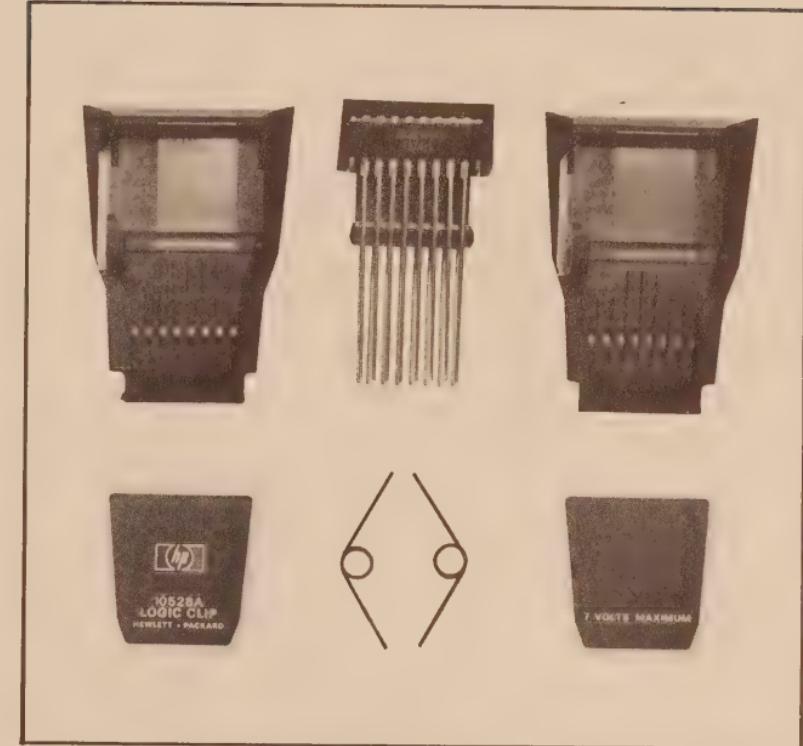


Figure 8. Final Assembly



Figure 9. Logic Clip Parts



## 10. REPLACEABLE PARTS

The logic clip replaceable parts are listed below.

Description	HP Part No.	Quantity
½ Plastic Case*	10528-40001	2
“HP” Foil Label	7120-2724	1
“7 volts” Foil Label	7120-2725	1
Contact Pin	10528-20001	16
Spring	10528-20002	2

\*When ordering plastic case halves, order HP foil label and 7-volt foil label as required.

# HEWLETT-PACKARD SALES AND SERVICE OFFICES

To obtain servicing information and order replacement parts, contact the nearest Hewlett-Packard Sales and Service Office in HP Catalog, or contact the nearest regional office.

## IN THE UNITED STATES:

### CALIFORNIA

3939 Lankershim Blvd.  
North Hollywood 91604

### GEORGIA

P.O. Box 28234  
450 Interstate North  
Atlanta 30328

### ILLINOIS

5500 Howard Street  
Skokie 60076

### NEW JERSEY

W. 120 Century Road  
Paramus 07652

## IN CANADA:

### QUEBEC

Hewlett-Packard (Canada) Ltd.  
275 Hymus Blvd.  
Pointe Claire

## IN EUROPE:

SWITZERLAND  
HEWPAK, S.A.  
1217 Meyrin  
Geneva

## IN AFRICA, ASIA, AND AUSTRALIA:

Hewlett-Packard Export Marketing  
3200 Hillview Ave.  
Palo Alto, California 94304

## IN CENTRAL AND SOUTH AMERICA:

Hewlett-Packard Inter-Americas  
3200 Hillview Ave.  
Palo Alto, California 94304





10528-90007

HEWLETT  PACKARD

PRINTED IN U.S.A.